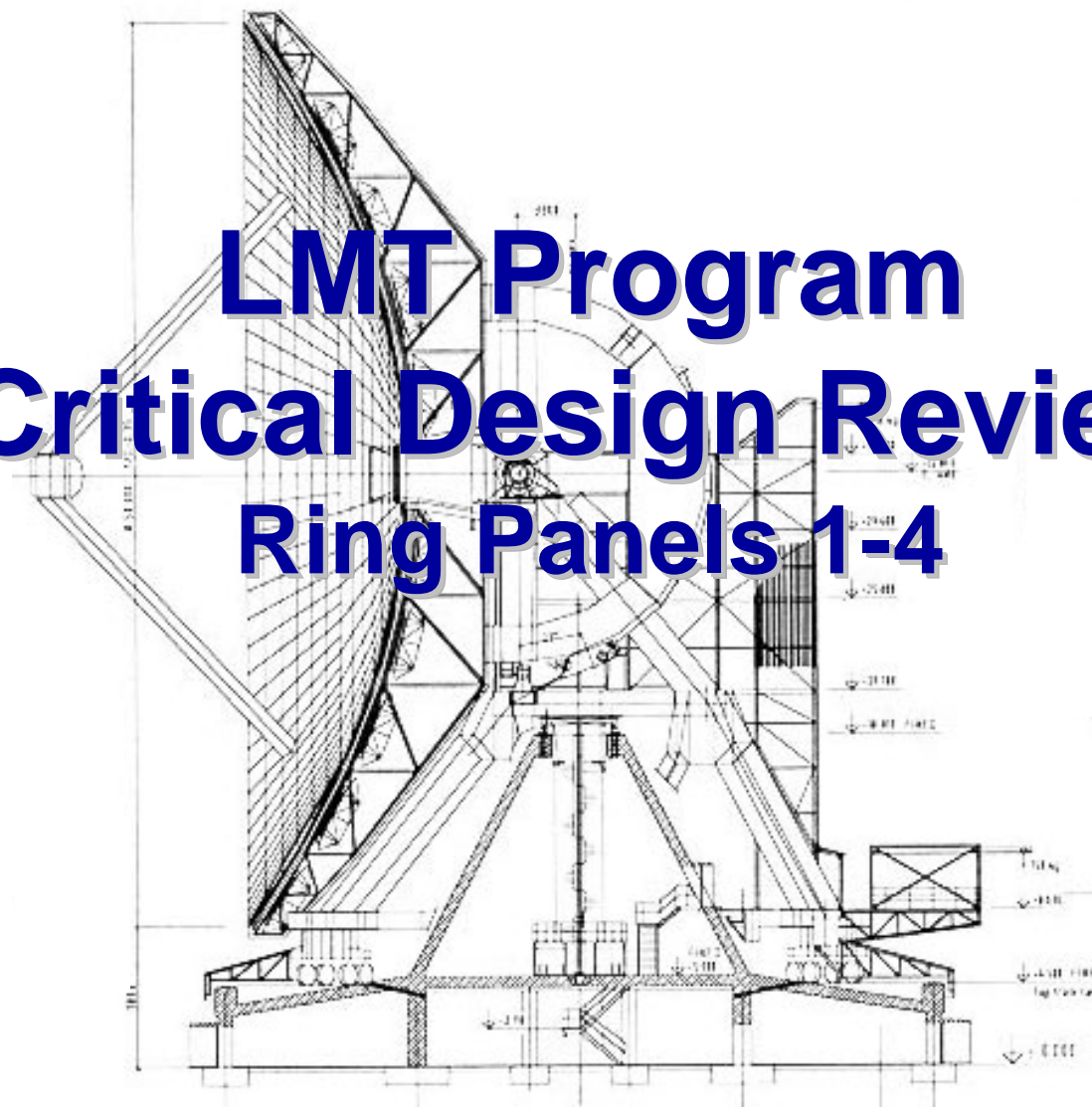




**ANTEDO, INC.**

# LMT Program Critical Design Review Ring Panels 1-4



**December 11, 2003**



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# Agenda

- |                                   |               |
|-----------------------------------|---------------|
| ◆ Introductions                   | 8:00 – 8:15   |
| ◆ Rings 1-4 Design Presentation   | 8:15 – 9:30   |
| ◆ Rings 1-4 Analysis Presentation | 9:30 – 11:30  |
| ◆ Lunch                           | 11:30 – 12:30 |
| ◆ Rings 1-4 Analysis Cont.        | 12:30 – 2:30  |
| ◆ EMT Discussion                  | 2:30 – 3:00   |
| ◆ Wrap Up                         | 3:00 – 3:30   |

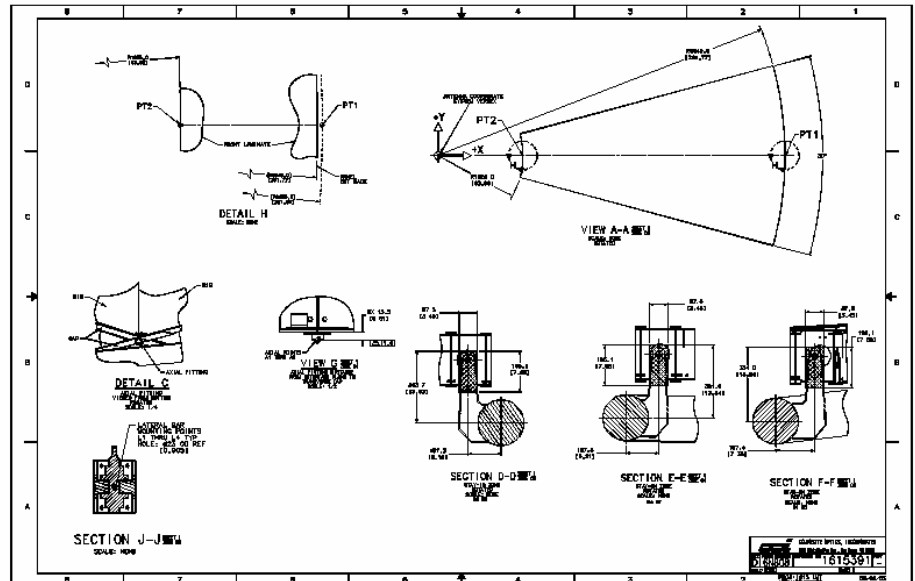
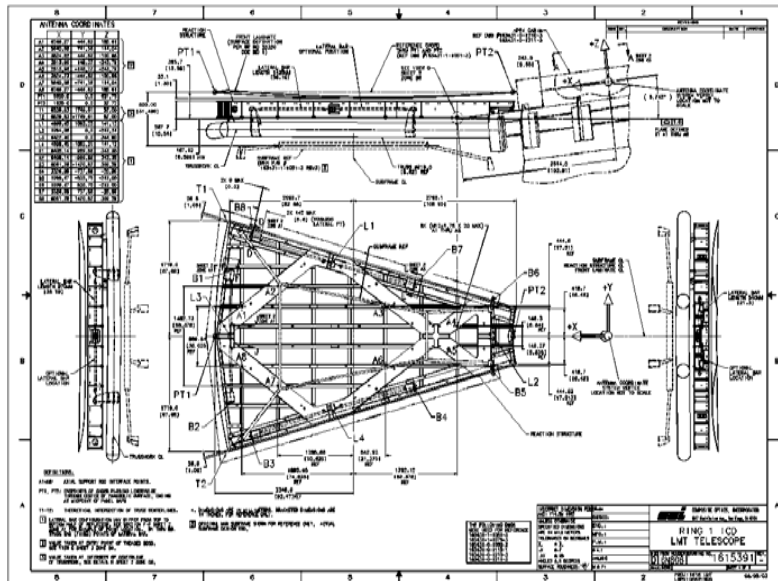
# **Rings 1-4 Design Presentation Outline**

- ◆ **Interface Control Drawings**
- ◆ **Design Similarities to Ring 5**
- ◆ **Top assembly views**
- ◆ **Truss Clearances**
- ◆ **Mass Summary**
- ◆ **Configuration Status**

# Interface Control

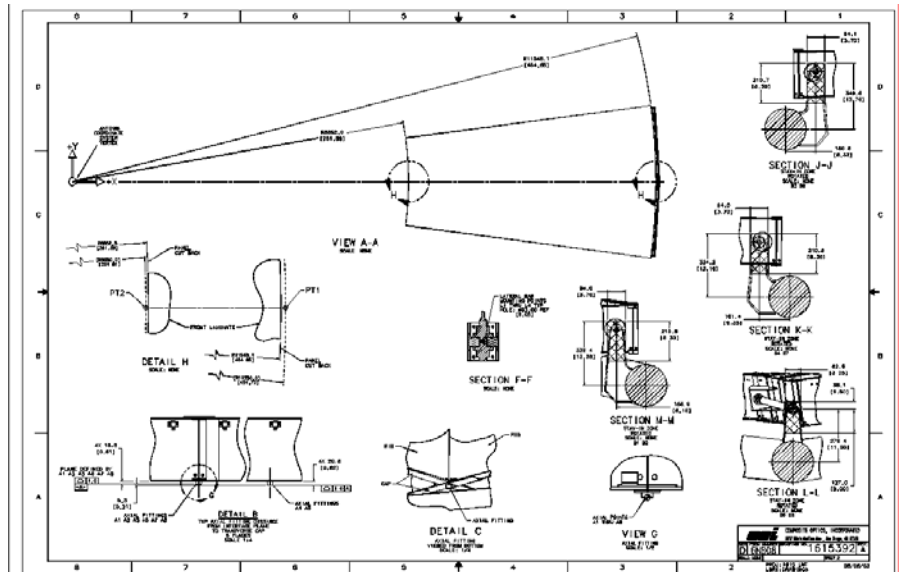
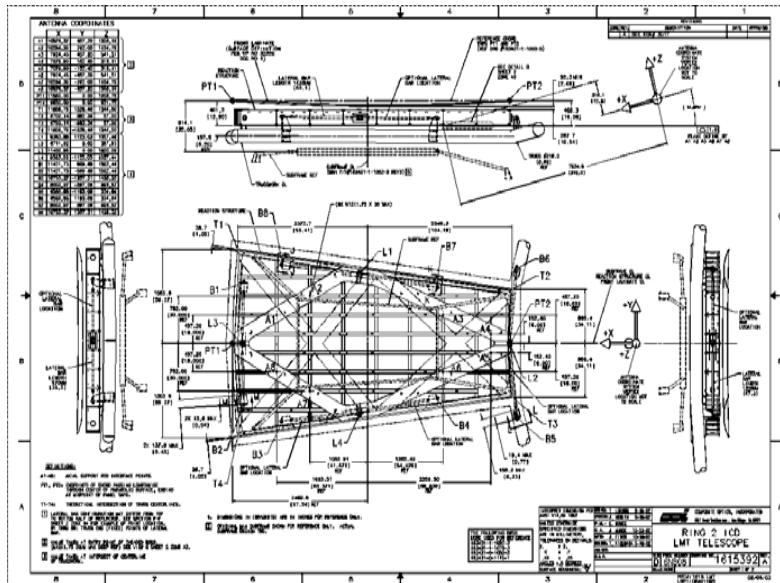
◆ Ring 1 ICD — COI Dwg # 1616391 Rev -

- » **Referenced MAN Drawings Which Provided Panel Dimensions**
- » **Interfaces Agreed and Locked at Rev – (08/13/03)**
- » **Satisfies Dimensional and Interface Requirements**



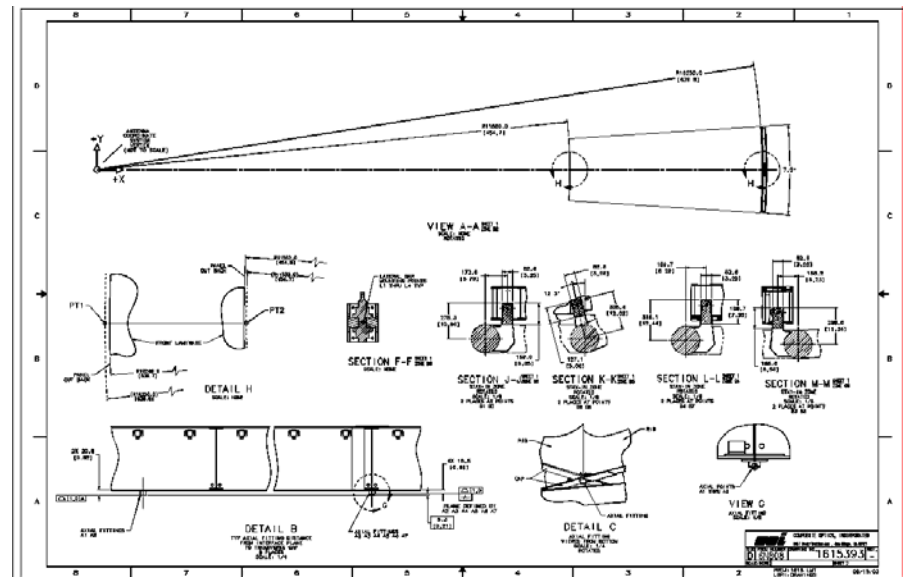
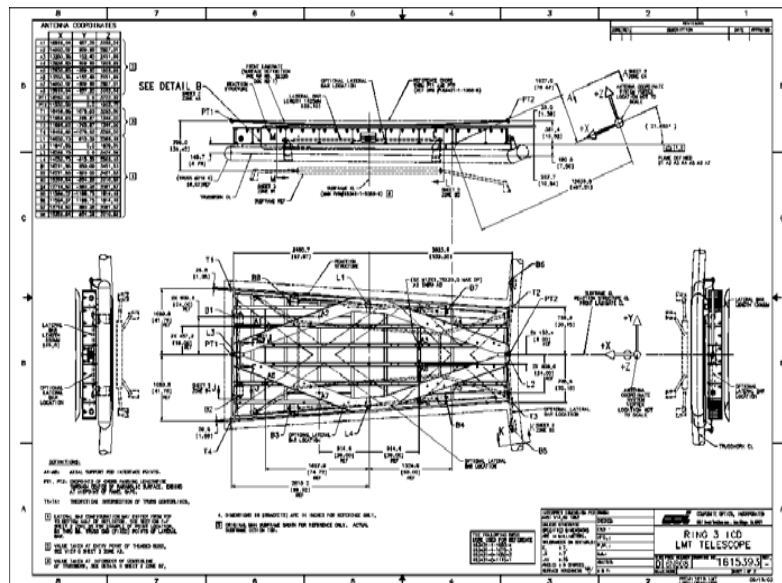
# Interface Control

- ◆ Ring 2 ICD — COI Dwg # 1616392 Rev A
  - » Referenced MAN Drawings Which Provided Panel Dimensions
  - » Interfaces Agreed and Locked at Rev – (08/13/03)
  - » Satisfies Dimensional and Interface Requirements



# Interface Control

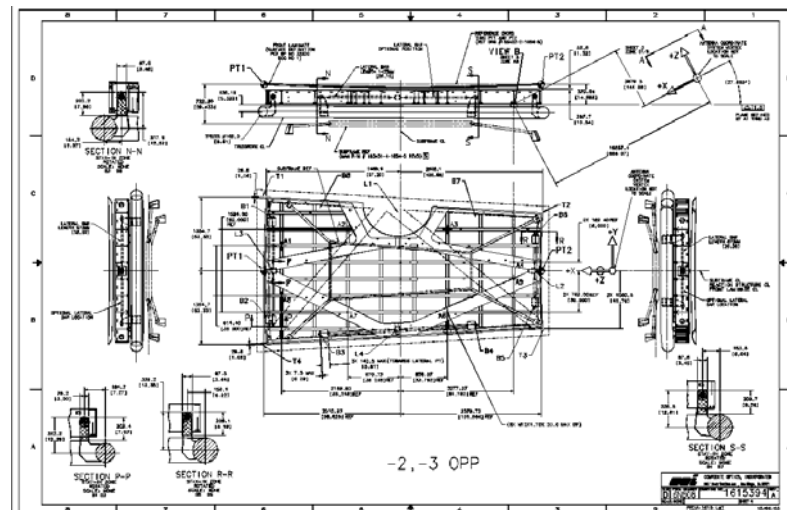
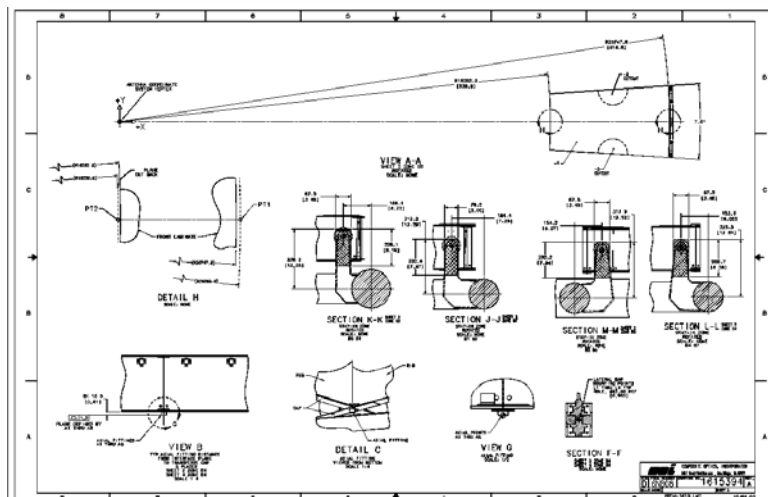
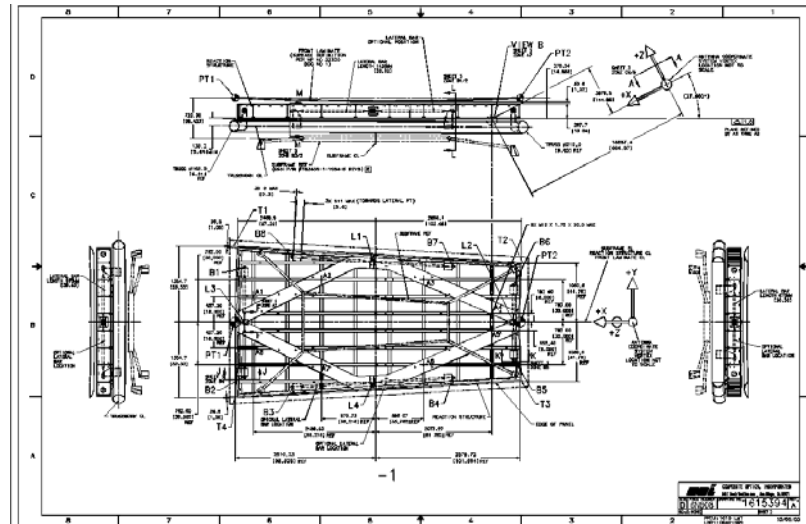
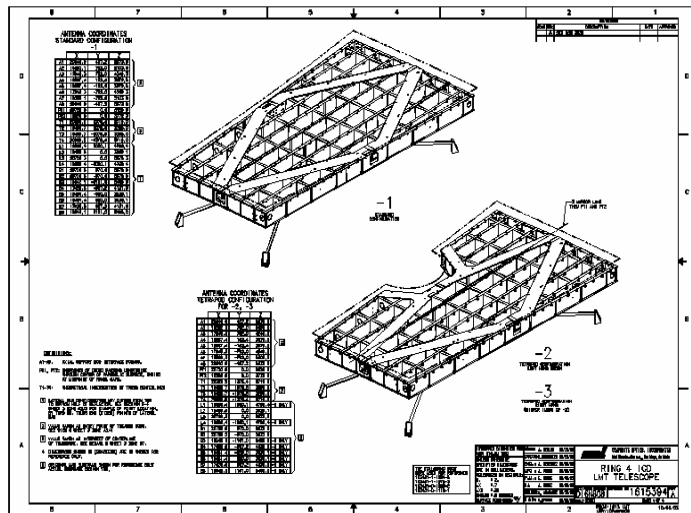
- ◆ Ring 3 ICD — COI Dwg # 1616393 Rev -
  - » Referenced MAN Drawings Which Provided Panel Dimensions
  - » Interfaces Agreed and Locked at Rev – (11/04/03)
  - » Satisfies Dimensional and Interface Requirements





# Interface Control

- ◆ Ring 4 ICD — COI Dwg # 1616394 Rev A
  - » Referenced MAN Drawings Which Provided Panel Dimensions
  - » Interfaces Agreed and Locked at Rev A (11/04/03)
  - » Satisfies Dimensional and Interface Requirements



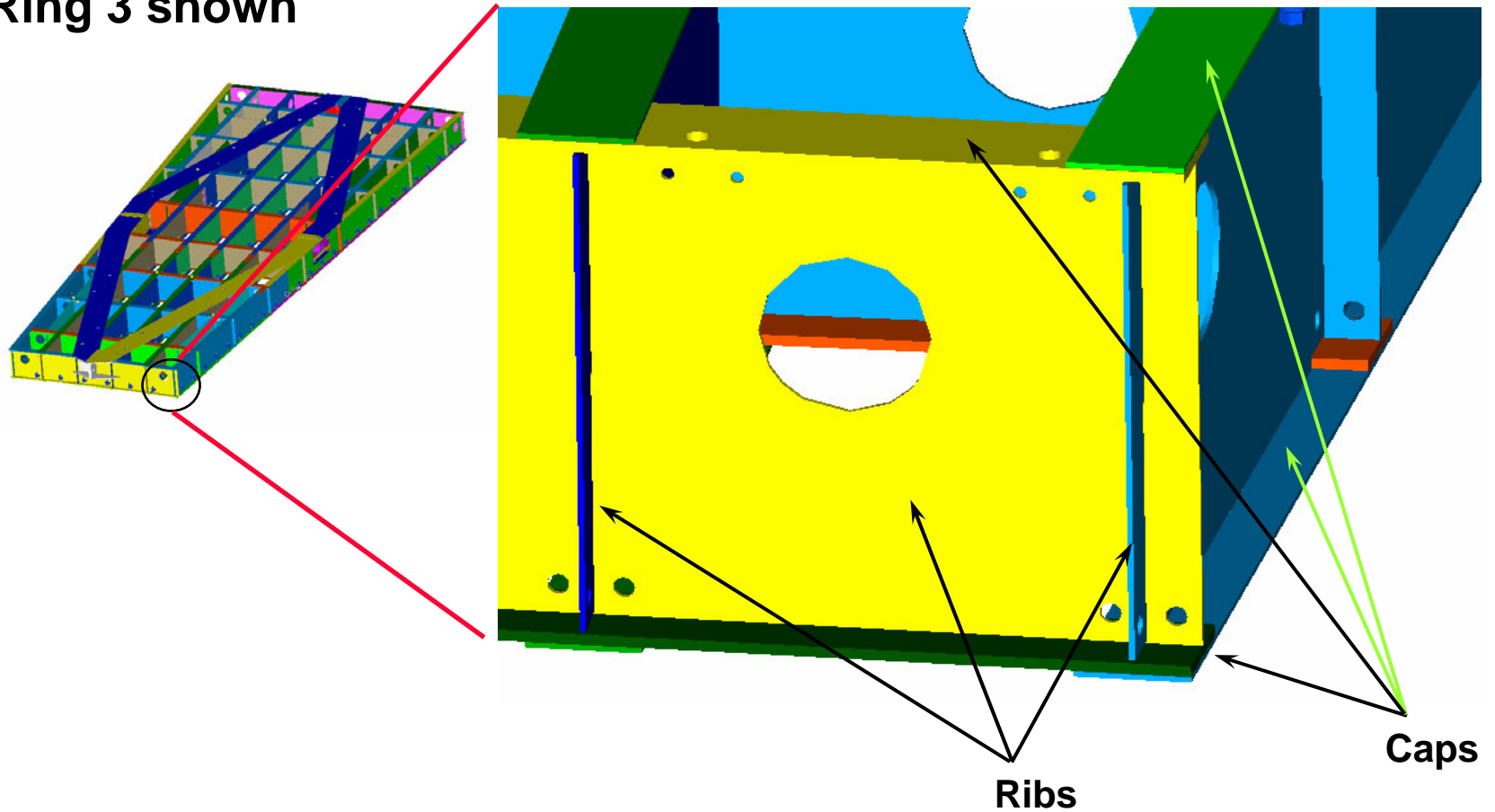


# Design Similarities with Ring 5

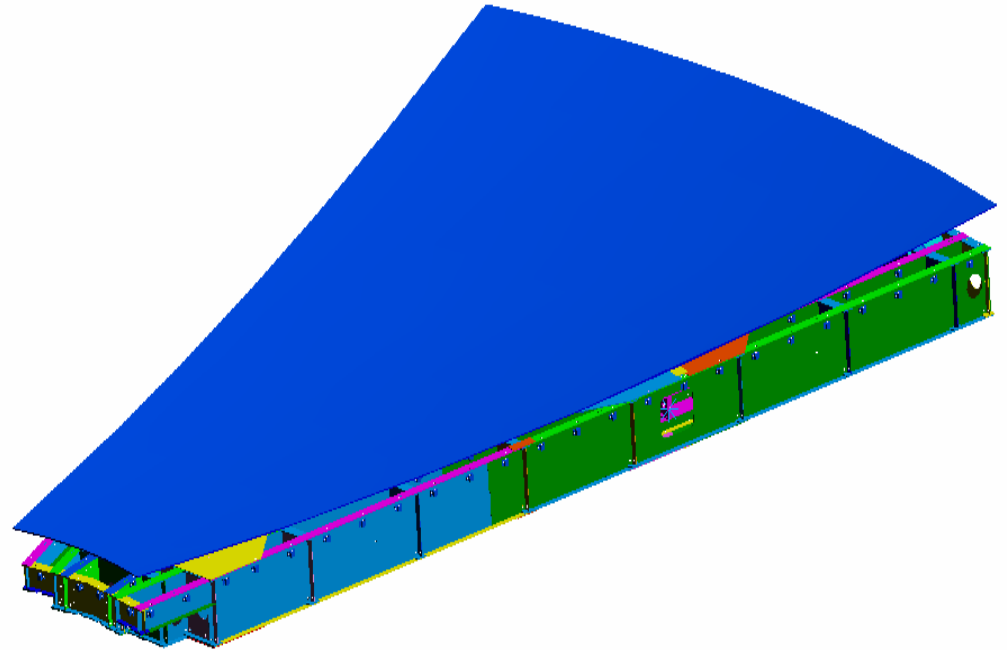
- ◆ Same axial and lateral fittings
- ◆ Same overall rib and cap geometry
- ◆ Same materials used in reaction structures and membranes
- ◆ Panel adjusters are same design:
  - » Ring 1: 176 adjusters per panel
  - » Ring 2: 174 adjusters per panel
  - » Ring 3: 142 adjusters per panel
  - » Ring 4 Generic: 182 adjusters per panel
  - » Ring 4 Tetrapod: 177 adjusters per panel

# Reaction Structure Components

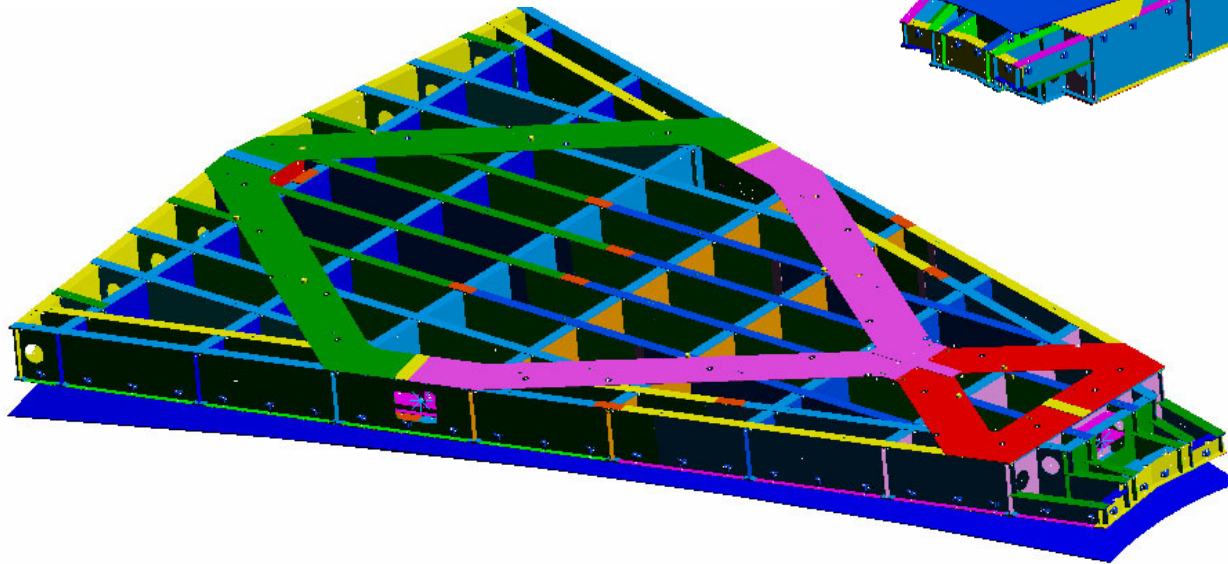
Ring 3 shown



# Ring 1 Top Assembly



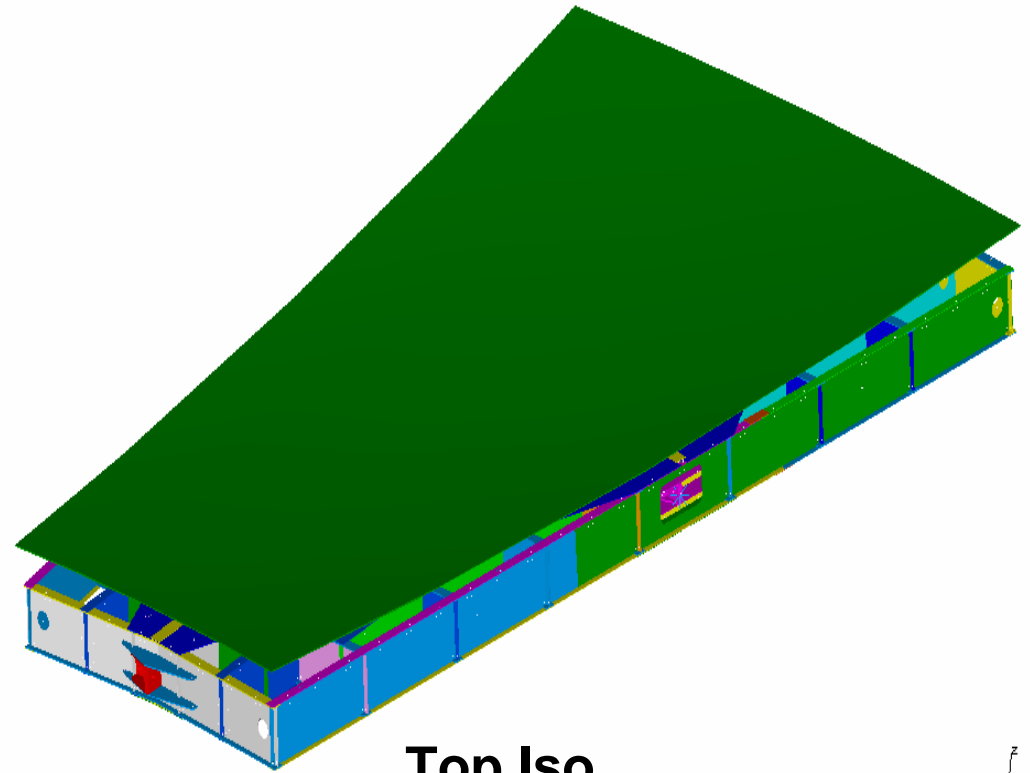
Top Iso



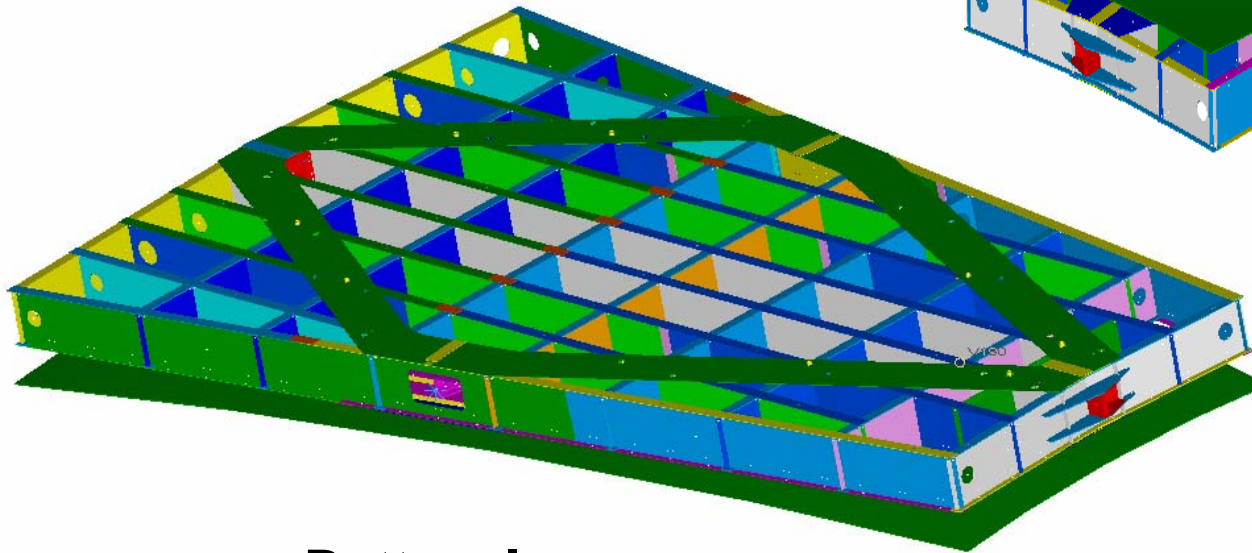
Bottom Iso

Adjusters Omitted for Clarity

# Ring 2 Top Assembly



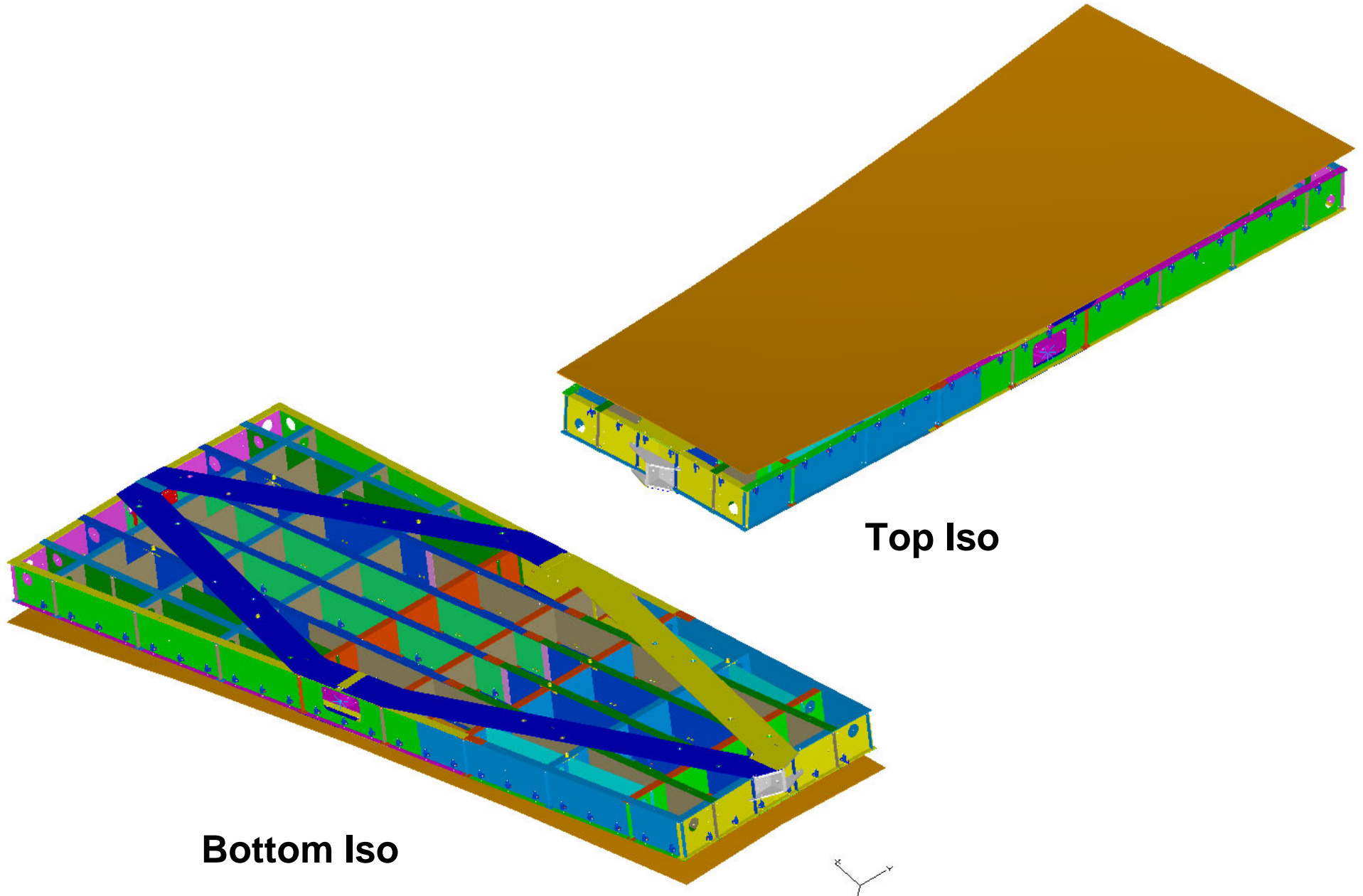
Top Iso



Bottom Iso

Adjusters Omitted for Clarity

# Ring 3 Top Assembly

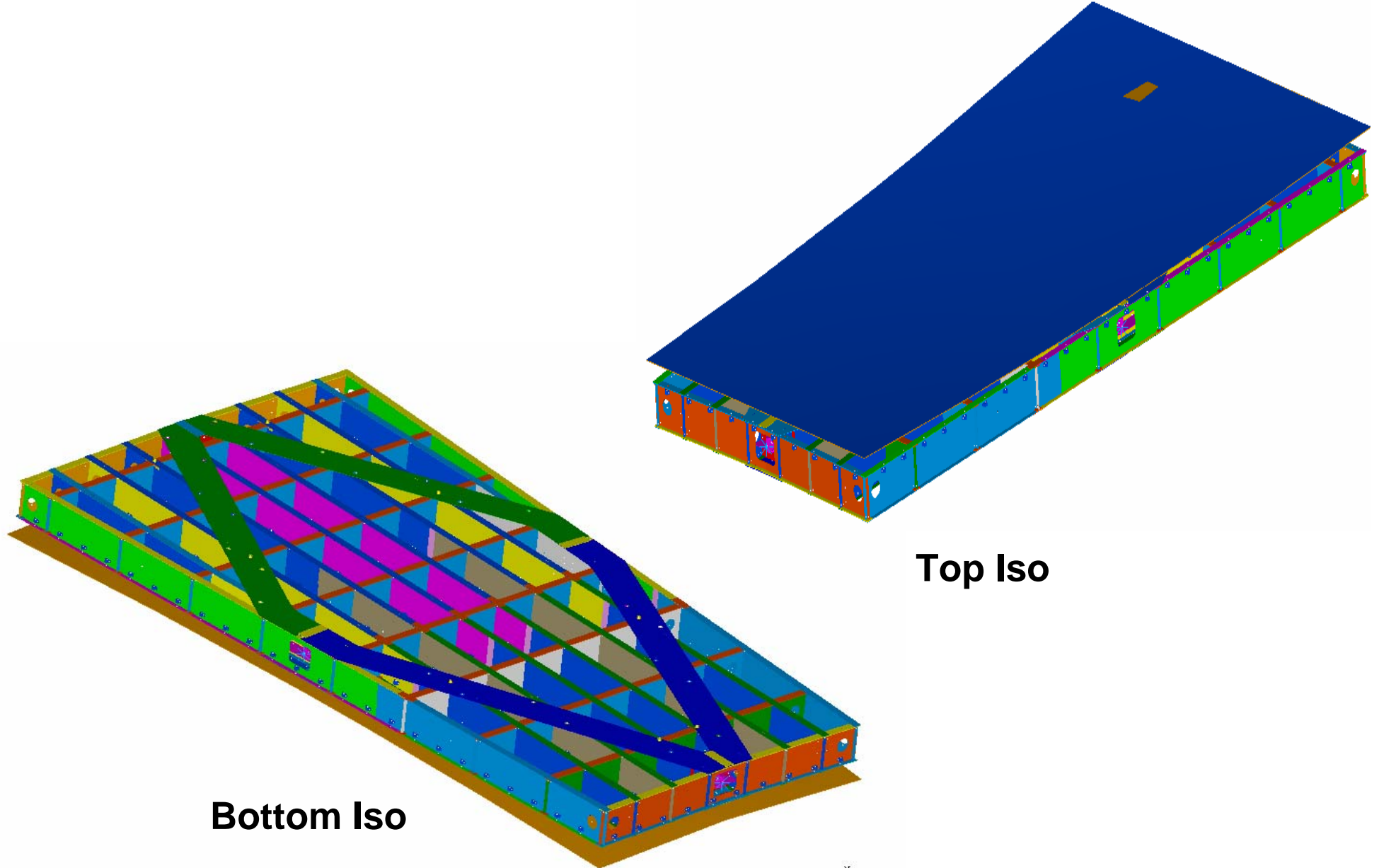


Top Iso

Bottom Iso

Adjusters Omitted for Clarity

# Ring 4 Generic Top Assembly



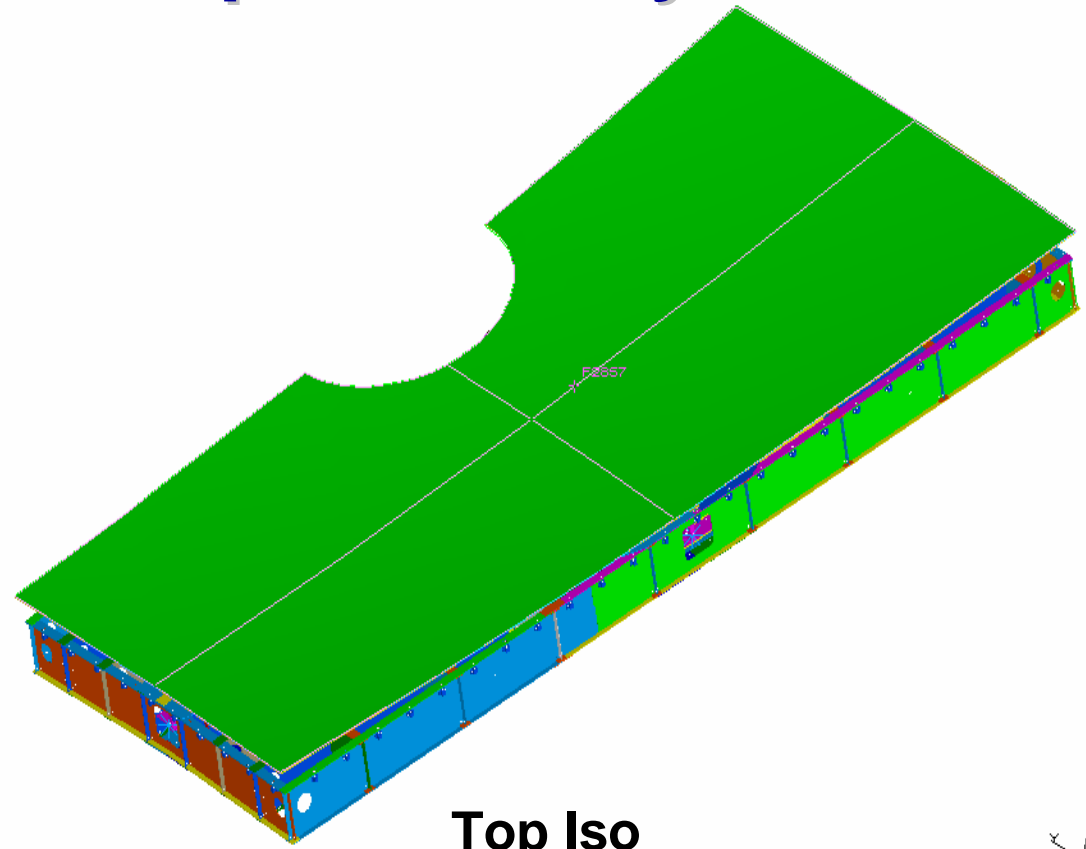
Top Iso

Bottom Iso

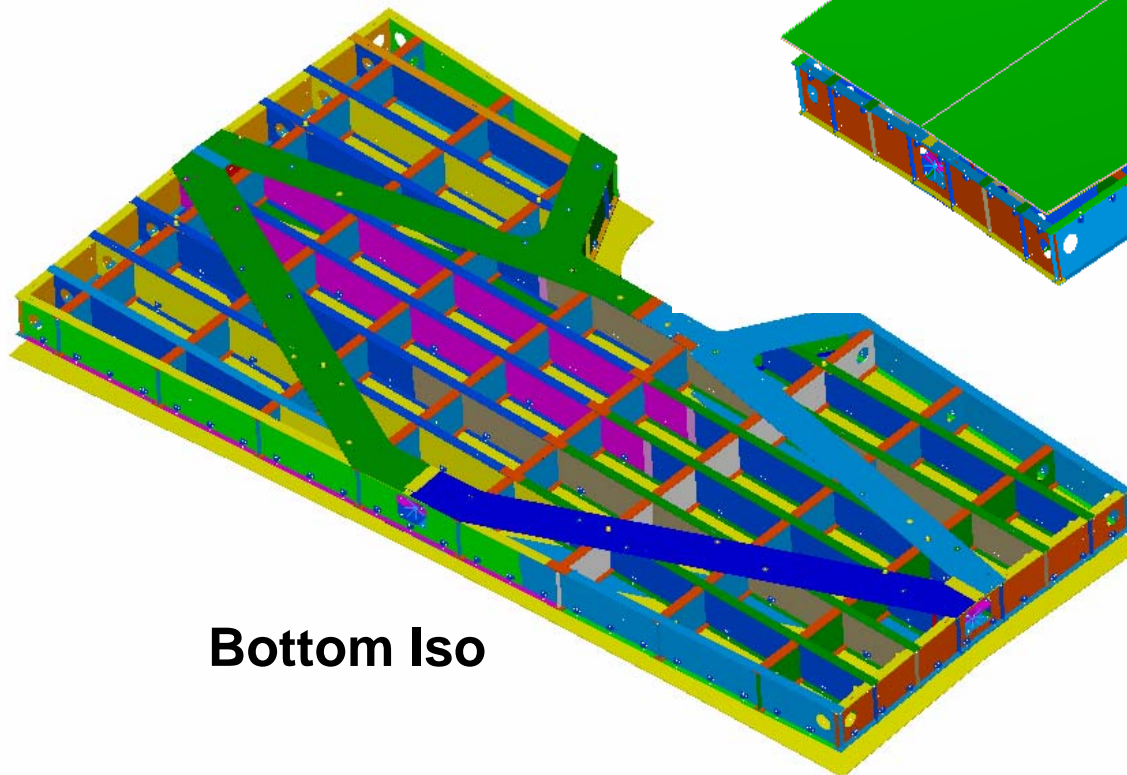
Adjusters Omitted for Clarity



# Ring 4 Tetrapod Top Assembly



Top Iso

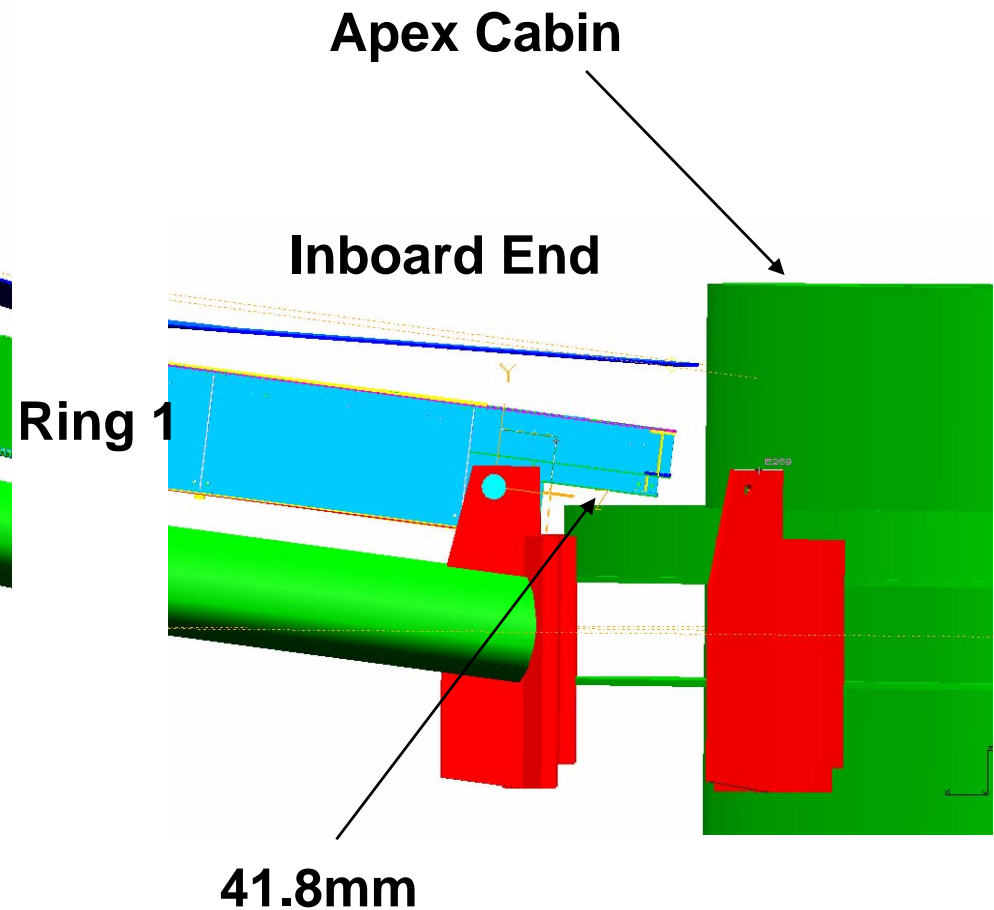
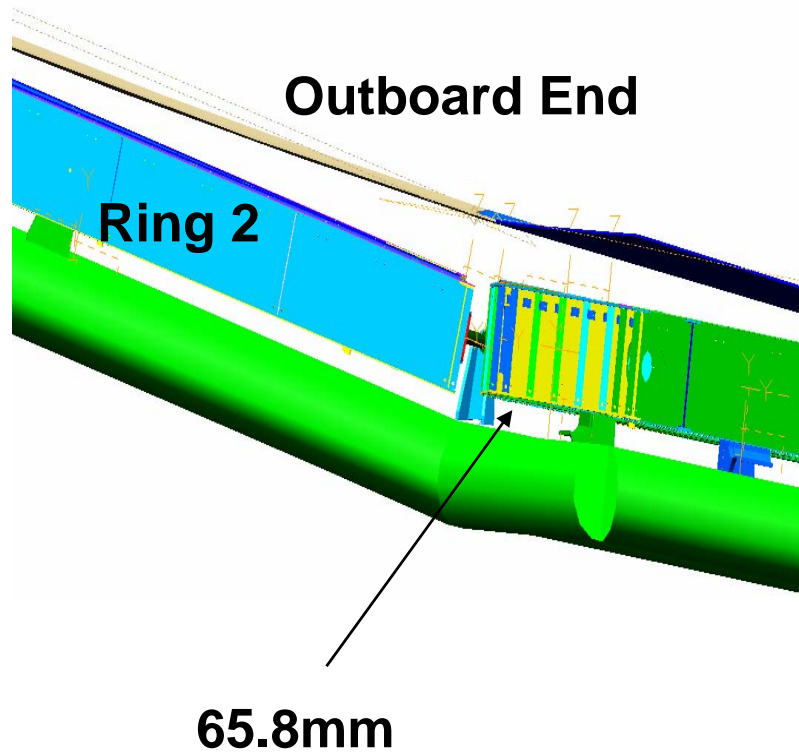


Bottom Iso

Adjusters Omitted for Clarity

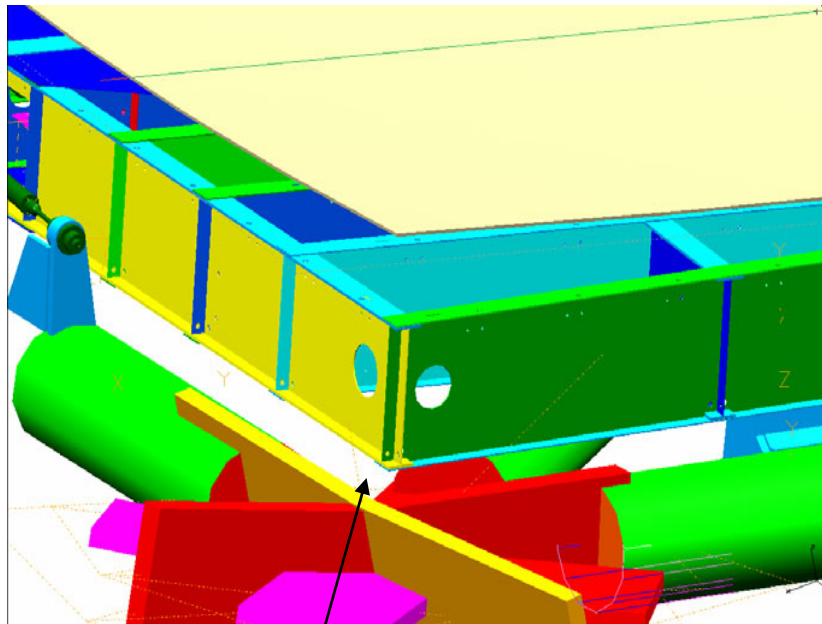
# Ring 1 Truss Clearances

- ◆ Values are the closest clearance to truss
  - » Parts modeled from nominal truss and panel dimensions



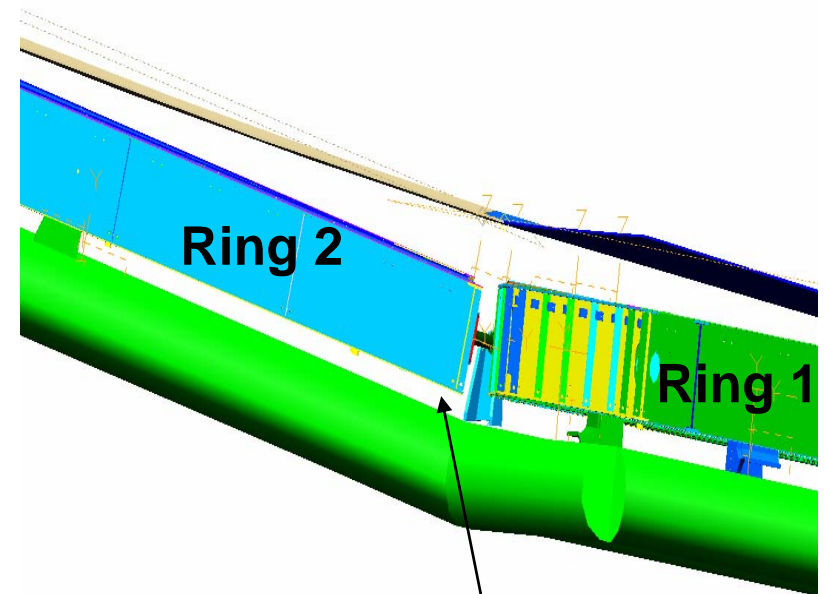
# Ring 2 Truss Clearances

- ◆ Values are the closest clearance to truss
  - » Parts modeled from nominal truss and panel dimensions



Outboard End

38.8mm

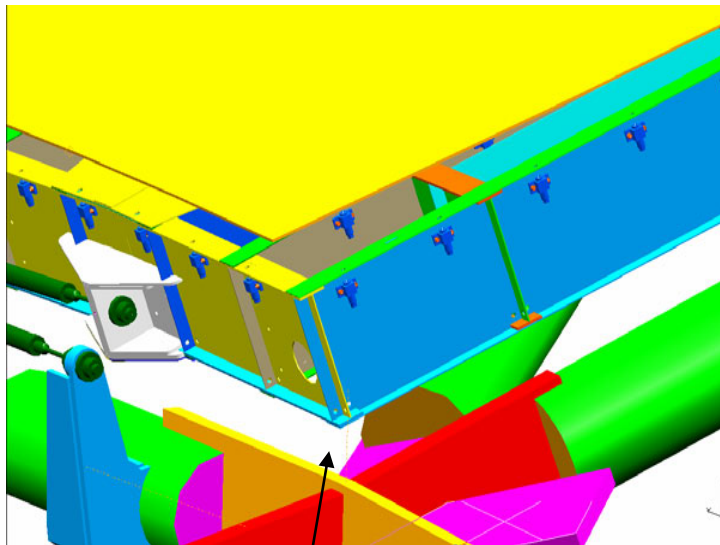


Inboard End

64.6mm

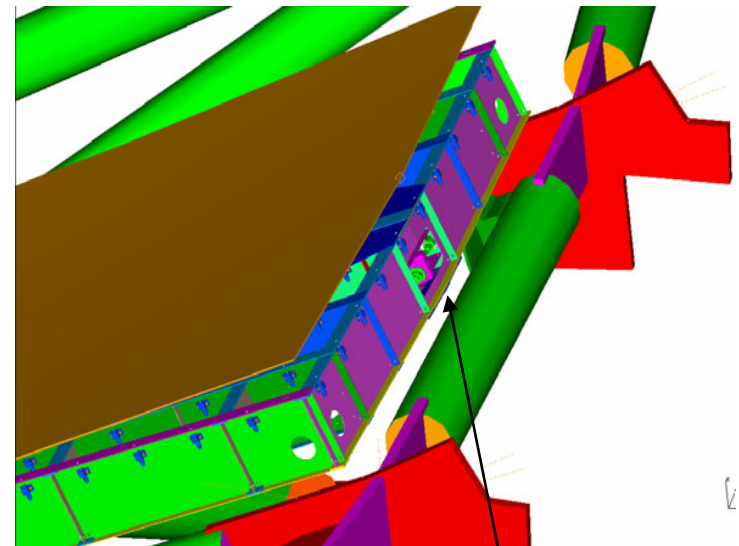
# Ring 3 Truss Clearances

- ◆ Values are the closest clearance to truss
  - » Parts modeled from nominal truss and panel dimensions



**Inboard End**

**80.1mm**

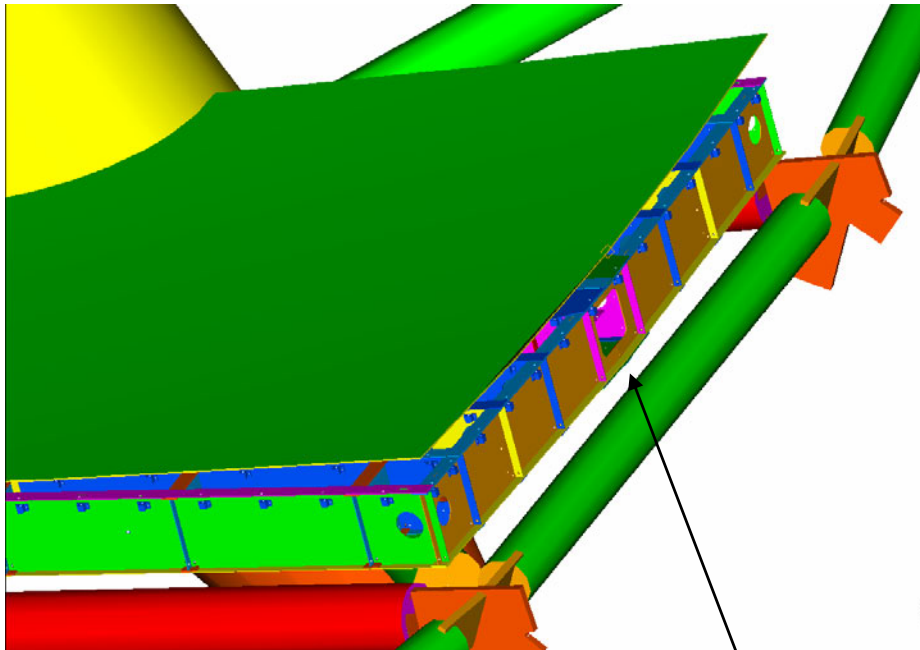


**Outboard End**

**33.0mm**

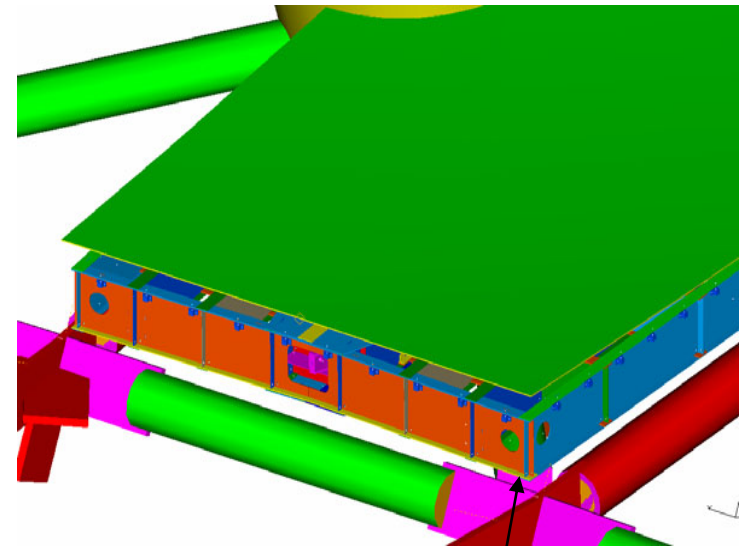
# Ring 4 Truss Clearances near Tetrapod (worst case)

- ◆ Values are the closest clearance to truss
  - » Parts modeled from nominal truss and panel dimensions



Outboard End

40.6mm



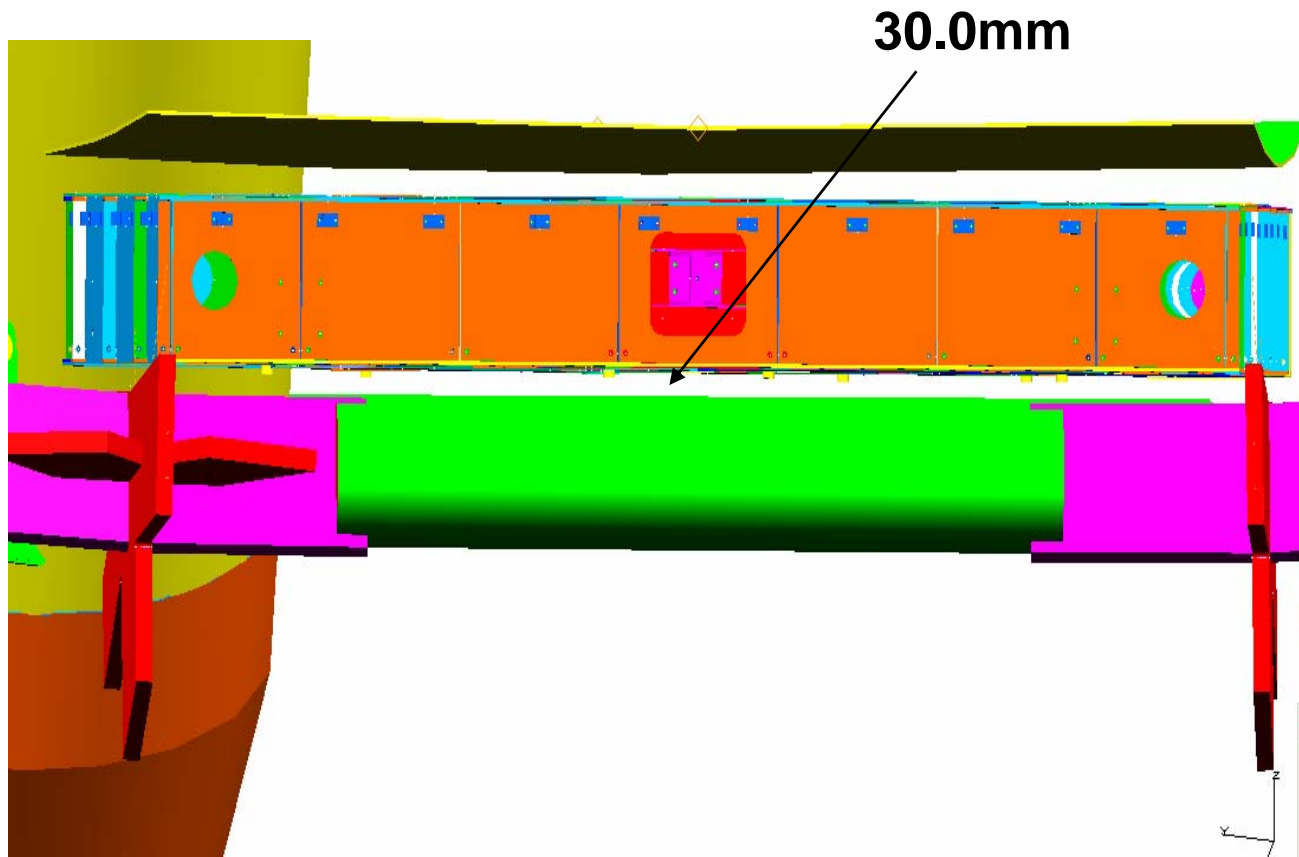
Inboard End

32.7mm



# Ring 4 Truss Clearances near Tetrapod Cont. (worst case)

- ◆ Values are the closest clearance to truss
  - » Parts modeled from nominal truss and panel dimensions



Front view showing diagonal truss tube



# Ring 1 Mass Summary

CDR Design Mass	
Panel Membrane	117 kg. (257 lbs.)
Fittings	
Lateral	8.4 kg. (18.6 lbs.)
Axial	3.8 kg. (8.4 lbs.)
Adjusters	33 kg. (72 lbs.)
Fasteners + Reinforcements	4.5 kg. (10 lbs.)
Reaction Structure Ribs / Caps / Dia.	132 kg. (292 lbs.)
Total	299 kg. (658 lbs.)
Membrane Area	11.86 m <sup>2</sup>
Weight / Area	25.2 kg./m <sup>2</sup>
Requirement	<=30 kg./m <sup>2</sup>

# Ring 2 Mass Summary

	CDR Design Mass
Panel Membrane	127 kg. (281 lbs.)
Fittings	
Lateral	10.6 kg. (23.3 lbs.)
Axial	3.8 kg. (8.4 lbs.)
Adjusters	32 kg. (71 lbs.)
Fasteners + Reinforcements	4.5 kg. (10 lbs.)
Reaction Structure Ribs / Caps / Dia.	129 kg. (284 lbs.)
Total	307 kg. (677.7 lbs.)
Membrane Area	12.96 m <sup>2</sup>
Weight / Area	23.7 kg./m <sup>2</sup>
Requirement	<=30 kg./m <sup>2</sup>

# Ring 3 Mass Summary

	CDR Design Mass
Panel Membrane	88.9 kg. (196 lbs.)
Fittings	
Lateral	10.6 kg. (23.3 lbs.)
Axial	1.9 kg. (4.18 lbs.)
Adjusters	26 kg. (58 lbs.)
Fasteners + Reinforcements	4.5 kg. (10 lbs.)
Reaction Structure Ribs / Caps / Dia.	116 kg. (255 lbs.)
Total	248 kg. (546 lbs.)
Membrane Area	9.20 m <sup>2</sup>
Weight / Area	26.9 kg./m <sup>2</sup>
Requirement	<=30 kg./m <sup>2</sup>

# Ring 4 GENERIC Mass Summary

	CDR Design Mass
Panel Membrane	121 kg. (267 lbs.)
Fittings	
Lateral	8.4 kg. (18.6 lbs.)
Axial	1.9 kg. (4.2 lbs.)
Adjusters	33.5 kg. (74 lbs.)
Fasteners + Reinforcements	4.5 kg. (10 lbs.)
Reaction Structure Ribs / Caps / Dia.	142 kg. (314 lbs.)
Total	312 kg. (688 lbs.)
Membrane Area	12.32 m2
Weight / Area	25.3 kg./m2
Requirement	<=30 kg./m2

# Ring 1 Configuration Management

## ◆ Released Drawings and Revisions

Drawing number	Description	Rev. level
1615301	Panel Assy	-
1615311	Reaction Structure Assy	A
1615501	Panel Adjuster	D
1615505	Lateral Fitting	A
1615515	Axial Fitting	A
1615525	Lateral Fitting	A
1615N801	Rib NC File	-
1615N811	Cap NC File	-
1615N821	Cap NC File	-
1615391	Ring 1 ICD	-
1615401	Membrane	A
Tooling		
1615101-1PDMO	Mold Assy	Not Rel
1615201	Assembly Fixture	Not Rel
1458101 PDMO	Mold Membrane	B
1458221	Panel Trim Tool	-
1615500	PDMO Adjuster	F

# Ring 2 Configuration Management

## ◆ Released Drawings and Revisions

Drawing number	Description	Rev. level
1615302	Panel Assy	-
1615312	Reaction Structure Assy	A
1615501	Panel Adjuster	D
1615505	Lateral Fitting	A
1615522	Lateral Fitting Ring 2	-
1615515	Axial Fitting	A
1615N802	Rib NC File	-
1615N812	Cap NC File	-
1615N822	Cap NC File	-
1615392	Ring 2 ICD	A
1615402	Membrane	A
Tooling		
1615102-1PDMO	Mold Assy	Not Rel
1615202	Assembly Fixture	Not Rel
1458102 PDMO	Mold Membrane	B
1458222	Panel Trim Tool	-
1615500	PDMO Adjuster	F



# Ring 3 Configuration Management

## ◆ Released Drawings and Revisions

Drawing number	Description	Rev. level
1615303	Panel Assy	-
1615313	Reaction Structure Assy	-
1615501	Panel Adjuster	D
1615505	Lateral Fitting	A
1615523	Lateral Fitting Ring 3	-
1615515	Axial Fitting	A
1615N803	Rib NC File	-
1615N813	Cap NC File	-
1615N823	Cap NC File	-
1615393	Ring 3 ICD	-
1615403	Membrane	A
Tooling		
1615103-1PDMO	Mold Assy	Not Rel
1615203	Assembly Fixture	Not Rel
1458103 PDMO	Mold Membrane	C
1458223	Panel Trim Tool	-
1615500	PDMO Adjuster	F

# Ring 4 Configuration Management

## ◆ Released Drawings and Revisions

Drawing number	Description	Rev. level
1615304	Panel Assy	-
1615314	Reaction Structure Assy	-
1615501	Panel Adjuster	D
1615505	Lateral Fitting	A
1615525	Lateral Fitting	-
1615515	Axial Fitting	A
1615N804	Rib NC File	-
1615N814	Cap NC File	-
1615N824	Cap NC File	-
1615394	Ring 4 ICD	A
1615404	Membrane	A
Tooling		
1615104-1PDMO	Mold Assy	Not Rel
1615204	Assembly Fixture	Not Rel
1458104 PDMO	Mold Membrane	B
1458224	Panel Trim Tool	-
1615500	PDMO Adjuster	F

# Rings 1-4 Analysis Presentation